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Molding Machines

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# MOLDING MACHINES

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BY

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THESIS FOR THE DEGREE OF BACHELOR OF SCIENCE  
IN MECHANICAL ENGINEERING

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IN THE  
COLLEGE OF ENGINEERING  
OF THE  
UNIVERSITY OF ILLINOIS  
PRESENTED JUNE, 1907



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June 1, 1907

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

WALTER COFFMAN PATON

ENTITLED MOLDING MACHINES

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE

OF Bachelor of Science in Mechanical Engineering

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## MOLDING MACHINES.

1. Introduction:

2. Discussion:-

(a) Pictures of up-to-date molding machines.

(1.) Their description and special features of the same.

(b) Commercial value to a factory.

Saving of time.

Saving of labor.

(c) Pictures and settings of a molding machine with stripper plate to mold Illinois souvenir book-rack.

(d) A comparative test between hand and machine molding.



Molding machines are no longer a foundry luxury. The economy required of foundry managers in all lines of work makes imperative the introduction of some type of molding machine. Practically every line of castings can now be successfully and economically molded on either power or hand machines.

Probably the latest form of molding machine is the gravity moulder, which as will be seen from Figure 1, has a conveyor, which elevates the molding sand to a height



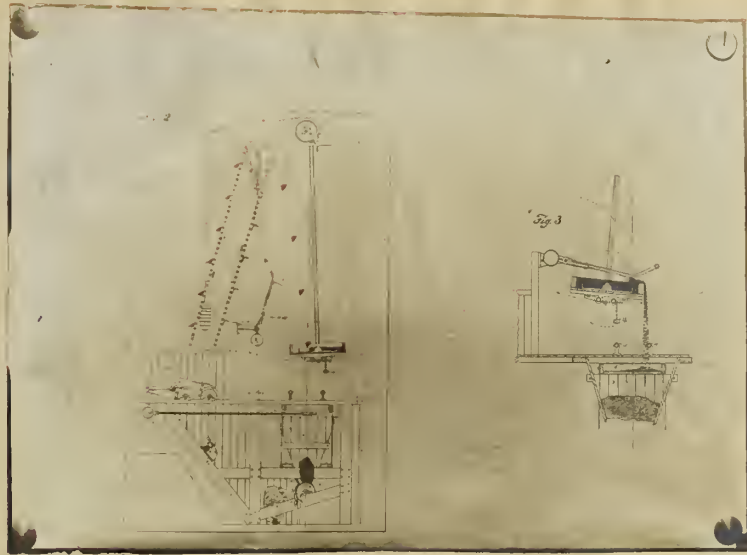
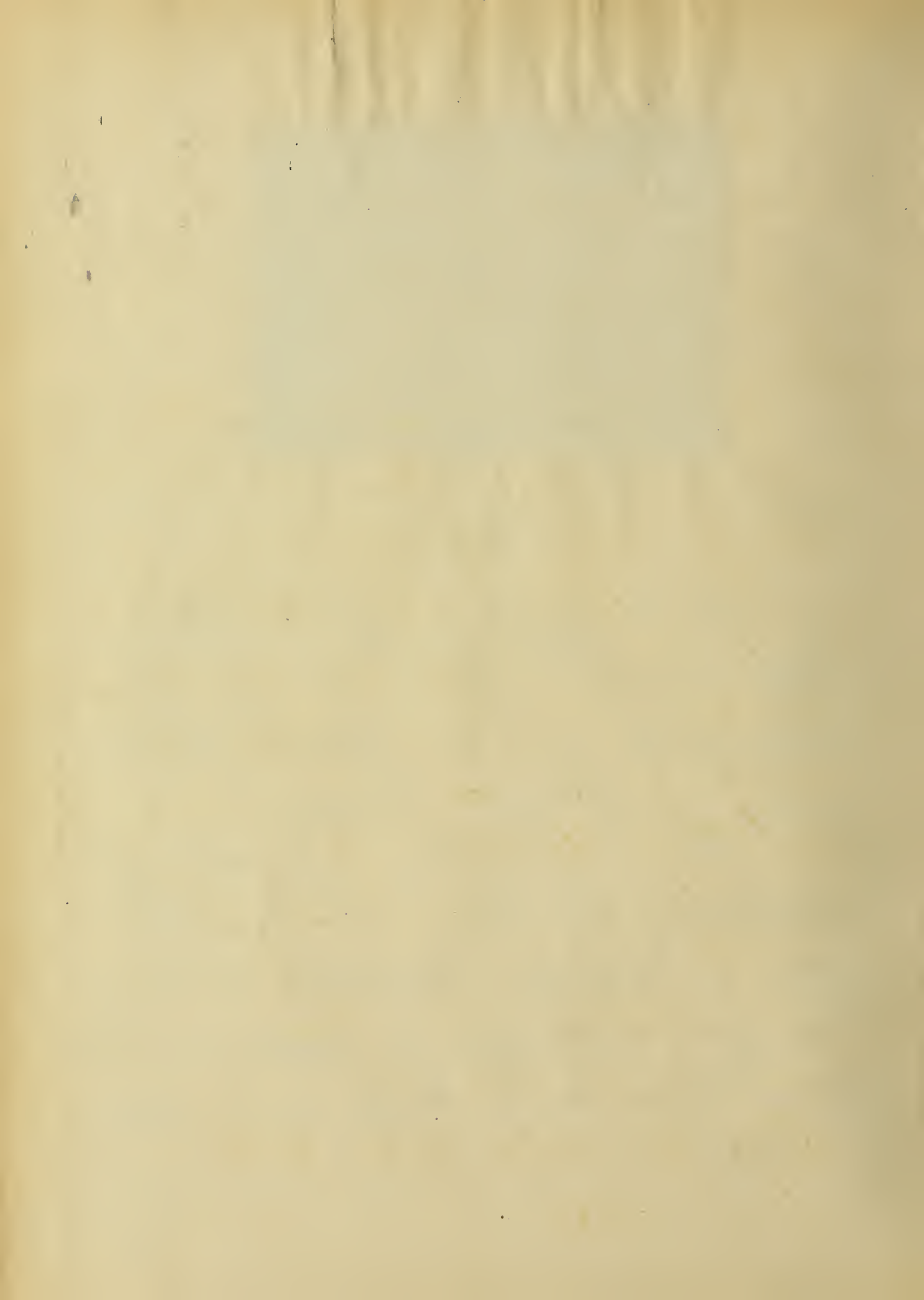


FIG. 1.

of about fifteen feet above the mold where it is discharged in compact bodies into a flask below.

This machine can be operated by one man with two or three helpers and a large saving in experienced molders and time are thus made.





The vibrator Split Pattern Machine was placed on the market in 1897, and has come into universal use in many foundries.

The present split pattern machine has been developed along lines of economy of pattern fitting and operation, and very rarely are stripping plates necessary. Thus obviating a sometime prohibitive feature of machine molding. Standard duplicate work, such as brass and iron valves and fittings, gray and malleable iron pipe fittings, soil pipe fittings, brake shoes, journal bearings



shoes, wedges, general locomotive castings, general machine castings, pulleys, journal boxes, etc., are all molded on this type of machine.

Power ramming split pattern machines are built in sizes ranging from 11" x 14" to 11" x 48", and from 14" x 16" to 15" x 85" and up to and including 30" x 48". These machines are built either square, rectangular or round.







FIG. 2.

Figure 2- shows a Tabor 16  $\frac{1}{2}$ " x 21", Power Ramming Split Pattern Machine, having power draft and fitted with automatic gear case pattern, also a drag mold with core.





FIG. 3.

Figure 3. - shows a Jabor Power Ramming Split Pattern Machine with hand draft, used for light work.



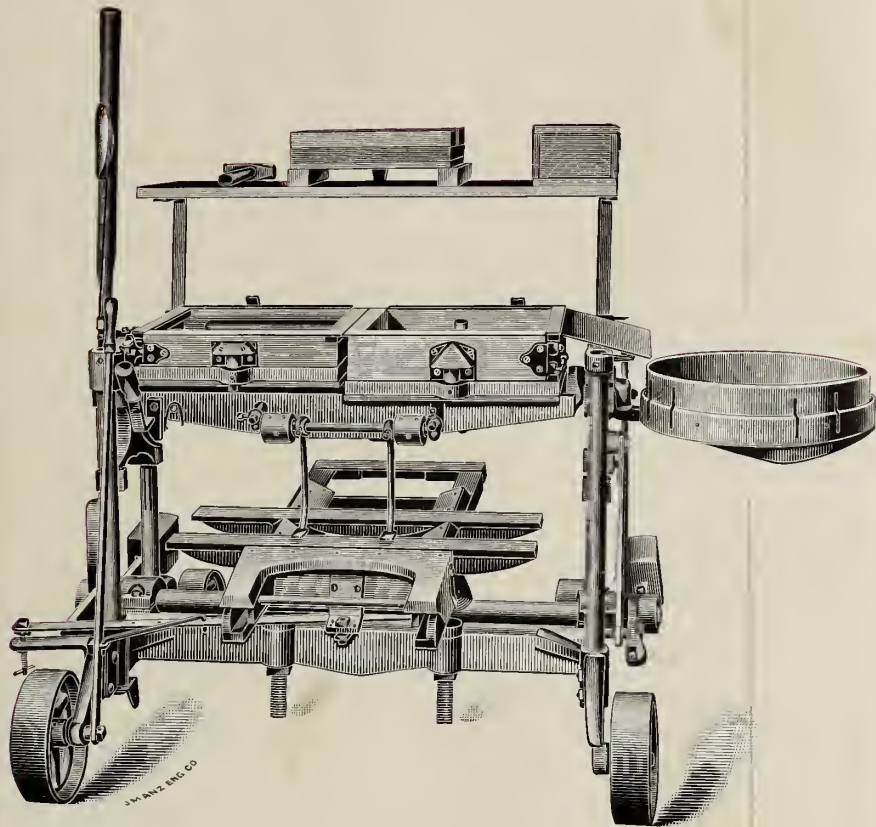


FIG. 4.

Figure 4.—known as the  
Modern Welding Machine  
is designed to handle light





castings, such as are usually made in flasks  $14 \times 20$  inches or less. It is successful in the molding for brass, malleable and gray iron castings and is doing a great variety of work with universal success.

The solution of the problem of a means to increase the output of a foundry without a proportional increase in the cost of labor is the use of molding machines, which can be operated by inexperienced help. This increases the daily output on numerous jobs from approx-



imately twenty molds to two-hundred and seventy-five molds per man. The castings are more uniform than when made by hand and the fact that green hands in place of skilled labor can be used, makes the result doubly profitable.

Machines using split patterns can be fitted up at one-third the cost of those requiring stripper plates.

Multiple molding is that branch of the molding art where the upper face of the cope of one mold is formed to make the drag face of a super-imposed





mould. A series of such moulds piled one above the other makes the Multiple stack.

Distinctive advantages of the Multiple Molding Machines as claimed by the manufacturer are as follows. —

Saves 85	per ct.	in	molding	labor.
"	75	"	"	" pouring.
"	75	"	"	" weighting and clamping.
"	40	"	"	" flasks used.
"	40	"	"	" sand.
"	88	"	"	" floor space.



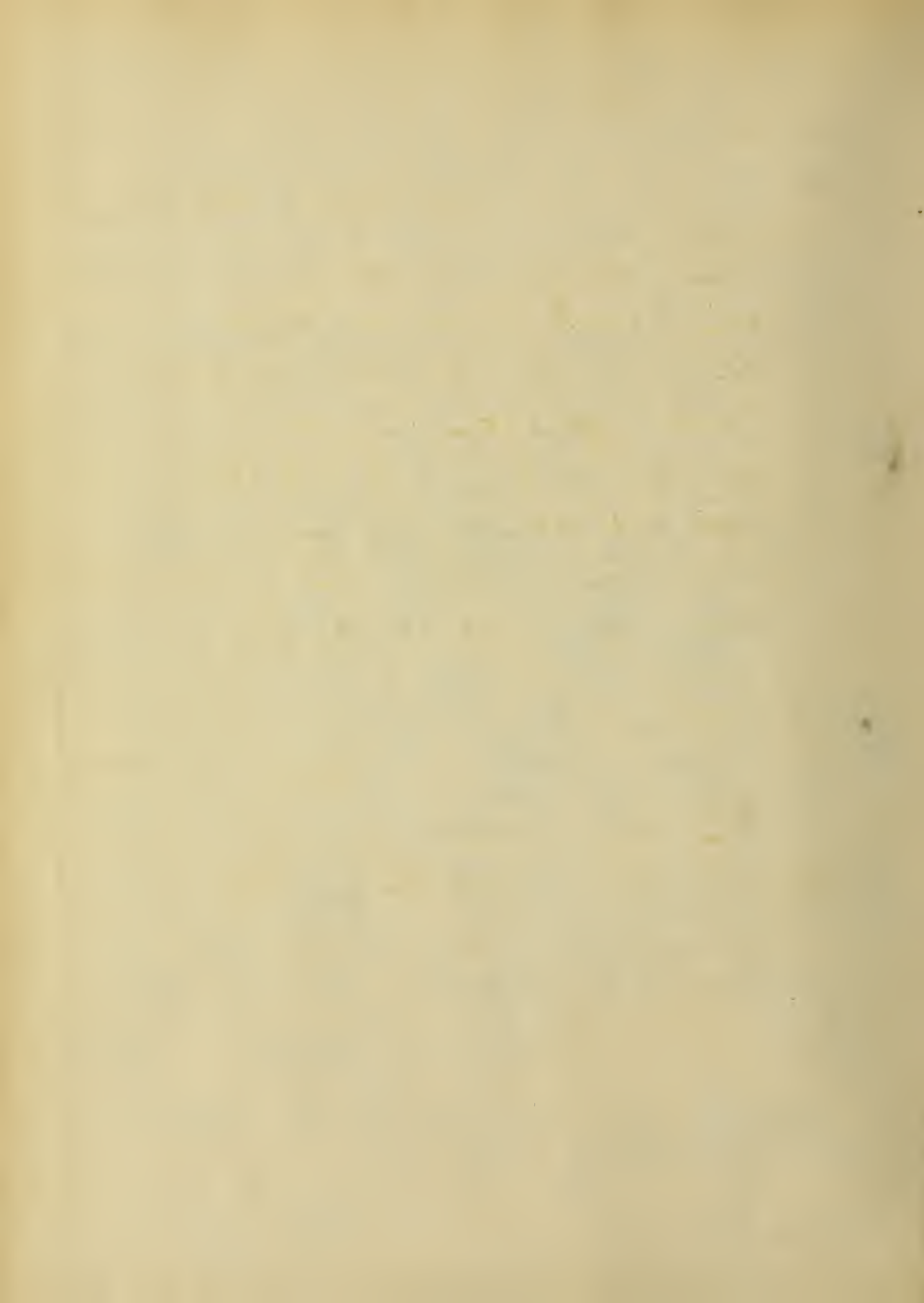
The following is a comparative test between the time required for hand and machine molding.

Time required by a first class molder in making a 13"x18" mold by hand.-

1	Places pattern and match on floor	10 sec.
2	Places drag over pattern	10 "
3	Fills drag with sand	8 "
4	Rams up drag	35 "
5	Strikes off drag	5 "
6	Beds on bottom board	15 "
7	clamps together match, drag, and bottom board.	12 "
8	Rolls them over	20 "
9	Lifts off match	12 "
10	Places cope on drag	10 "
11	Fills cope with sand	8 "
12	Rams up cope	35 "
13	cut or draws sprue	15 "
14	Raps pattern	20 "
15	Lifts off cope	20 "
16	Draws pattern	20 "
17	closes mold	20 "
18	carries mold to floor	55 "
19	Clamps or weights mold	20 "
20	Brushes pattern for next mold	11 "

Total 360 sec.

Thus so.- 13"x18" molds in an eight hour molding day.



Time required by machine operator in making a 13" x 18" mold on a Rathbone Multiple Molding Machine, -

1	Places flask on machine	-----	10 sec.
2	Drops sand frame over flask	--	5 "
3	Shovels sand into flask and frame		10 "
4	Strikes off extra sand	- - -	5 "
5	Operates valves and vibrator	---	6 "
6	Lifts out collapsible sprue	---	1 "
7	Places completed mold on stack	-	21 "
8	Blows off sand ready for another flask	-----	2 "
9	Making drag	-----	40 "
Total			100 sec.

Thus 288 - 13" x 18" moulds in an eight hour molding day.





The writer has fitted up a Pridmore Molding Machine with pattern and stripper plate for molding an Illinois souvenir book-rack.



FIG. 5.

Figure 5 is an illustration showing the design and the stripper plate.



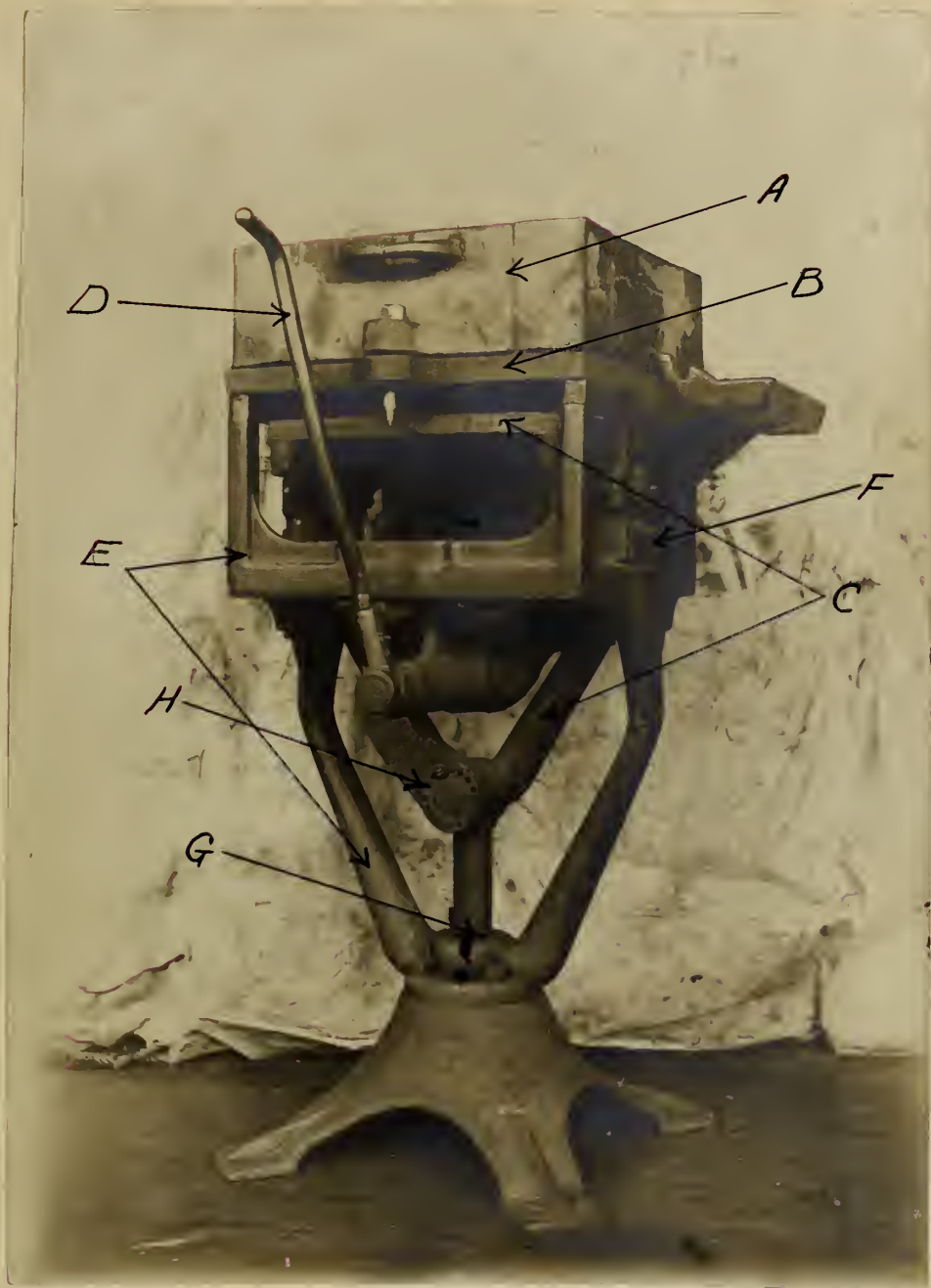


FIG. 6.

Figure 6 shows a Pridmore machine manufactured by Henry C. Pridmore of Chicago



with a drag (A) in position on machine ready for sand.

The removal of the pattern from the sand is accomplished by the use of a stripping plate (B) and a yoke (C) to which the patterns are attached. By a downward movement of the handle (D) the patterns are positively and accurately lowered from the mold through the stripping plate (B). By this method all possibility of the patterns being damaged is eliminated, and castings absolutely true to pattern are insured.

The machine consists of a strong stiff frame (E) having two or more sets of adjustable guide ways (F) in and near







the top of the frame on which the stripping plate is supported, while in the base of the frame and at a comparatively great distance from the upper guide ways there is a single centrally located, brass bushed guide way (G). This construction gives in effect a long rigid guide way, in which the yote carrying the pattern is raised and lowered by means of a crank, shaft and lever. The crank shaft is journaled in a long brass bushed box firmly secured to the bottom of the upper frame (E).

There are simple adjustments on the machine regulating



the amount of draw to the different heights of patterns. There is also a single brass bushed eccentric adjustment (H) in the lower end of the yoke, which takes up all wear either on the yoke or crank pin. The only other parts of the machine subject to wear are the ways upon the sides, and these also are adjustable.

This pattern was molded by hand - 7 completed molds per hour. As mounted on the machine - 17 completed molds were made per hour. This rate refers to molds made by inexperienced student molders in our University foundry.









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